

XLVII.—*Descriptions of Sponges from the Neighbourhood of Port Phillip Heads, South Australia, continued.* By H. J. CARTER, F.R.S. &c.

[Continued from p. 441.]

Order VIII. CALCAREA.

Structure composed of contorted, repeatedly branched, anastomosing, tubular threads, forming a reticulated mass which at length assumes a more or less definite form.

1. *Clathrina** *cavata*.

Individualized. Massive, compressed or round, contracted towards the base; composed of tortuous, hollow or tubulated thread-like filaments, almost infinitely and irregularly branching and anastomosing; compactly reticulated above, becoming looser and more open in structure below, where it finally ends in a few of the same kind of hollow filaments, which are attached to the object (mussel-shell) on which it may be growing. Colour sponge-brown when fresh, lighter when dry. Surface even, irregularly reticulated. Pores numerous, passing *through* the wall of the hollow thread. Vents of two kinds, viz. spurious and real; the former more or less in plurality scattered over the surface generally or confined to the upper border, consisting of short, thin-walled, cylindrical prolongations extended from the *outside* of the wall of the tubulated thread, which prolongations are in direct communication with the interstices of the reticulated mass generally, but more especially with dilated portions of this mass extending for a short distance inwards in the form of a cavity; *real* vents consisting of circular holes here and there in the wall of the reticulated tubulation, which not only open into the so-called cavities or dilated portions, but in all probability exist throughout the structure, where they would open into the interstices generally of the reticulated mass. Structure that above mentioned, whose staple is the "tubulated thread," of which the wall is very thin and skeletally composed of a single layer of radiate spicules held together by sarcode supporting the softer parts, which here appear to consist chiefly of a layer of spongozoa in juxtaposition, and not gathered into the form of ampullaceous sacs, together with a remarkable quantity of those organs which consist of nucleated cells surrounded by an abundance of glistening spherical granules, which Häckel has figured and named

* Dr. J. E. Gray's name for this kind of sponges (see 'Annals,' 1884, vol. xiv. p. 17 &c.).

“nuclei” (Kerne) of his “syncytium” (*op. cit.* ‘Atlas,’ Taf. i. fig. 3). Spicules of two forms, viz. triradiates and quadriradiates, the latter in very subsidiary quantity. Triradiates comparatively small, variable in form and size, but chiefly equiarmed and equiangled. Quadriradiates about the same size. Ray of the largest triradiates on the surface about 30 by $4\frac{1}{2}$ -6000ths. The latter composing the skeletal structure of the tubulation generally, the former sparsely scattered throughout, but most numerous about the “spurious vents,” apparently without any particular position, as the fourth arm appears here and there, both inside and outside the wall of the tubulation, and the same about the cylindrical prolongations or spurious vents. Of this species there are four specimens, the largest of which is compressed and somewhat triangular in shape, $1\frac{1}{2}$ inch high by $2 \times \frac{1}{2}$ horizontally at the upper border.

Obs. This is evidently a representative of the *Clathrina* which grows so abundantly on the under surface of rocks in this neighbourhood, viz. Budleigh-Salterton (‘Annals,’ 1884, vol. xiv. p. 18); but as there appear to be no rocks at the sea-bottom in Australia, where it was dredged, it grows on shells or the agglomerated material of these parts. Moreover, it differs from the *Clathrina* of this place, in which the cylindrical prolongations on the surface are in *direct* continuation with the *interior* of the tubulation, like that of the next species that will be described, while in *C. cavata* they are *only* in communication with the *dilated parts* of the interspaces.

We have evidently here a foreshadowing of the vent and cloaca, which are more perfectly developed in *C. tripodifera* and following species.

It belongs to Hæckel’s Ascones of course, and seems, but for the presence of the spurious vents, to be almost identical with his *Ascetta clathrus* (*op. cit.* Atlas, Taf. iv. figs. 1-3). As for the difference in spiculation which the presence of the quadriradiates makes in Hæckel’s classification, this may be cancelled under the view that it is a “connective variety,” like his *Ascetta primordialis* (vol. ii. p. 17).

2. *Clathrina osculum*.

Individualized, social. Globular, stipitate, presenting on the summit a short, cylindrical, hollow process, and ending below in one or more filiform stems fixed to the object on which it has grown, composed throughout of a mass of tubulated thread-like filament growing by almost infinite and irregular branching and anastomosis into the form above

mentioned. Colour sponge-brown when fresh, when dry dark grey. Surface even, uniformly reticulate, interstices about 1-120th in. in diameter. Pores numerous, passing *through* the wall of the hollow thread. Vent single, tubulated, at the summit of the specimen, composed of a thin, cylindrical extension of the *walls of the tubulation*, which at this part opens into it by a plurality of holes, and thus enters into its composition. No defined cloacal dilatation. Structure already stated, composed of the same kind of staple thread as *C. cavata*, but smaller and more compact in its reticulation; wall of the tubulated thread very thin and skeletally composed of a single layer of triradiate spicules held together by sarcode, and lined by the softer parts, which here also appear to consist chiefly of a layer of spongozoa in juxtaposition, that is without being gathered into the form of ampullaceous sacs, together with a remarkable quantity of those organs which consist of nucleated cells respectively surrounded by an abundance of glistening spherical granules, which Hæckel has figured and named "nuclei" (Kerne) of the syncytium, as before stated. Stem apparently an extension of the tubulated thread, but more solid. Spicules of one kind only, viz. tri-radiates of different sizes, but for the most part equiarmed and equiangular, intercrossing each other on the surface so as to give the interstices of the reticulation here a polygonal border; spicules more plentiful and *larger* than in *C. cavata*, ray of the larger ones averaging 42 by 5-6000ths in. in its greatest dimensions. Size of individual, of which there are two joined together, about 5-24ths in. in diameter; stem about 1-24th in. long and 1-48th in. in diameter.

Obs. To what size this species might ultimately grow I am ignorant, but that above described appears to be very small. It is, however, amply large enough to show in the section that the tubular vent is the *outlet of the tubulated structure*, and that, although there is no absolutely cloacal dilatation, this is indicated by the reticulated structure in the centre immediately under the vent being more open than towards the circumference. In these two particulars, then, it differs from *C. cavata*, not more so, perhaps, than in the size and abundance of its spicules, especially on the surface, whereby the thickness of the wall of the tubulation here appears to consist of a plurality of layers instead of one only as in *C. cavata*. The tubulation is charged internally with *ova* in the unsegmented state, large, and presenting the germinal vesicle.

Upon the authority of Hæckel I have stated that the "nuclei," mentioned in the two last species, are in his "syn-

cytium ;” but, entertaining a different view of their nature, I must refer the student for my explanation of this assumption to the ‘Annals’ of 1884, vol. xiv. pp. 20 and 21. The species is very like Schmidt’s *Nardoia reticulum* (Spong. Küste v. Algier, p. 28, Taf. v. figs. 7 and 8).

3. *Clathrina tripodifera*.

Conical, rather compressed, sessile, fixed, with cloaca and wide mouth; or ovoid and free, with cloacal cavity, but *no* mouth, that is Hæckel’s “Auloplegma”-form. Texture delicate. Colour of the former pinkish brown (?derived from having been in proximity with a similarly coloured sponge); that of the other specimens whitish grey. Surface even, uniformly presenting a ridged *quasi* fibro-reticulated structure whose interstices are more or less triangular, owing to the sigmoid flexure of the ridges, which thus resemble a “plaited frill.” Pores in the ridges. Vents of two sizes, viz. small and large: 1, small, numerous, situated in the bends or interstices of the sigmoid ridges, about 1-96th in. in diameter; 2, large, about 1-48th in. in diameter, scantily and irregularly scattered over the surface; both on a level with it, and both irregular in their outline, which is unmarginated, and all leading into the intervals between the *echinated* tubulation, which intervals are shut off from the cloaca by the lining membrane of the latter, as will be more particularly mentioned hereafter. This applies to all the forms, both open and closed, while in the “open” there is, of course, the addition of the vent or mouth to the cloaca, which is smooth and naked, and the cloaca in all presents a blistered-like surface, rendered uneven by a great number of infundibular depressions irregularly scattered over it; echinated throughout with the fourth ray of radiate spicules, and in direct communication at the bottoms of the “infundibular depressions” with the *echinated* tubulation of the general structure; also here and there with the “intervals” between this tubulation, by a few subsidiary apertures, which thus appear to be more accidental than general. Structure massive, tubular; tubulation subcircular, averaging 1-48th to 1-72nd in. in diameter, composed of a *single* layer of radiate spicules held together by sarcode, supporting the other soft parts, extending almost directly, that is being scantily branched, from the cloaca to the surface, leaving the “intervals” before mentioned between, which are very irregular in form, and for the most part much wider. Tubes *densely and strikingly* echinated with the fourth ray of quadriradiates, whose curve is directed *inwards*; while the other rays, imbedded in the sarcode, go to form the

wall of the tube, thus leaving the surface towards the "intervals" *smooth*, by which the "tube" and the "interval," by contrast, are sharply differentiated; tubes or tubulation, as before stated, in direct communication with the cloaca through its infundibular depressions, becoming more or less tortuous, branched, and anastomosing as they extend outwards towards the surface, where they become divided and sigmoidally plicated, ending in the *quasi* fibro-reticulate ridges, whose structure is pierced by the pores, as above noticed. "Intervals" *smooth*, more or less in communication with each other, so as to apparently form a general chamber, which is shut off from the cavity of the cloaca, except through the "subsidiary apertures" just mentioned, opening on the surface through the "small and large vents" already described. "Subsidiary apertures" in the cloaca on a level with its surface, *not* in the infundibular depressions, *not* echnated, but margined by a thin rim of sarcode, irregular in shape, size, and position. Wall of the "tubes" plentifully pierced by pores between the arms of the radiates, and the same with the lining structure or membrane of the cloaca; in short, there seems to be no surface in which *they* are absent, on all occasions. Spicules of two kinds, viz. triradiate and quadriradiate. Triradiate of two forms, viz. :—1, large, equiarmed and equiangulated, with the arms bent downwards and outwards sigmoidally, all together, like a "three-legged stool," each arm about 29 by 6-6000ths in., and the summit of the tripod about 24-6000ths in. from the base; 2, simple, triradiate, equiarmed, equiangulated, arm about 25 by $2\frac{1}{2}$ -6000ths in. in the average largest size; 3, quadriradiate, about the same size as the foregoing, with the addition of the fourth ray, which for the most part is long, curved, and varies in length under 30-6000ths in. The tripod form of the triradiate is confined to the ridges on the surface, where it is rather sparse; the common form to the surface generally, and the quadriradiates to the tubulation and surface of the cloaca respectively. Size of the largest specimen possessing a mouth (for there are three or more in the collection) $2\frac{1}{4}$ in. high by a maximum of $1\frac{3}{4} \times 1$ in. horizontally; cloaca $\frac{3}{4}$ by $\frac{2}{8}$ in. horizontally; mouth $\frac{3}{4}$ by $\frac{2}{8}$ in., also horizontally. Auloplegma-form like a goose-egg, $\frac{3}{8}$ in. in its longest diameter by a maximum of $2\frac{1}{2} \times 1\frac{3}{4}$ in. horizontally; cloaca $2\frac{1}{2}$ in. in its longest diameter, by $1\frac{1}{4} \times \frac{2}{8}$ in. horizontally; wall about $\frac{3}{4}$ in. thick.

Obs. The most striking part of this species is the tubular *echnation*, with regard to which it may be observed that, if the current is to be indicated by the direction of the *curve* of the fourth ray of the quadriradiates, as in the cloaca of *Grantia*

ciliata, in which it is directed outwards, it should here be in the opposite direction, viz. towards the cloaca; while the reproductive elements, viz. large ova presenting the germinal vesicle, as will be more particularly described presently, are on the *inner* surface of the *echinated* tube; therefore the analogy here is not between the echinated tubes and the cloaca of *Grantia ciliata*, but between the echinated tubes and the radial chambers of the latter; while the "intervals" would be analogous to the intercameral spaces or "intercanal system" of Hückel.

It may also be observed that the spiculation would be identical with that of my *Leucetta clathrata* ('Annals,' 1883, vol. xi. p. 33, pl. i. figs. 13-17), which came from the south-west coast of Australia, but for the *presence* of the quadri-radiate spicule, and the *comparatively* scanty presence of the tripod spicules on the ridges of the surface.

The Auloplegma-form is plentifully charged with ova filled with minute spherical granules, in the midst of which is the germinal vesicle &c. The ova are about 1-24th in. in diameter, the germinal vesicle about 1-1200th, and the germinal spot 1-6000th in. in diameter. There are also much smaller nucleated granuliferous cells about twice as large as the spongozoa, that is about 1-2000th in. in diameter. What may they be?

Besides this the specimen is abundantly infested by a minute oscillatorian filament in bacilliform fragments of different lengths, very much resembling in form the *Trichodesmium Ehrenbergii* which colours the Red Sea.

4. *Clathrina tripodifera*, var. *gravida*.

Individualized. Small when compared with the foregoing specimens, to which it will be found to be closely allied. Triangular, compressed, contracted towards the base or point of attachment, expanded above, composed of tortuous, branching, anastomosing reticulate tubulation more or less interstitially separate. Colour sponge-brown when fresh, whitish yellow when dry. Surface uniformly even, retiform, consisting of the superficial part of the tubular reticulation of which the whole body is composed, rendered prominent and glistening by a great abundance of the tripod spicules. Pores in the wall of the tubulation throughout. Vent-like openings three or four in number, chiefly in the upper border, defined by simple circular apertures in the general tissue, *not* margined, leading into cloacal cavities below, which consist of equally simple dilatations of the reticulate tubulation at this part. Structure generally consisting of a minute, tortuous, branching and anastomosing hollow thread

or tubulation, around the cloacal cavities just mentioned, which respectively descend, narrowing towards the base and widening upwards until they become contracted again towards the vent. Tube composed of a single layer of triradiate spicules *only*, held together by the sarcode and its accompanying soft parts, among which, in this instance, a number of ova are present, which, by their size and the presence of the germinal vesicle, indicate that they are near to segmentation; traversed plentifully by pores, and opening here and there by circular holes into the cloacal dilatations, which is probably the case throughout the interstices of the reticulation generally; both the tubulation and the interstices varying greatly in diameter under 1-100th in., largest on the surface of the cloaciform dilatation, smallest towards the circumference. Spicules of *one kind only*, viz. triradiate, but of *two* distinct forms, as in the foregoing, viz.:—1, tripod-like, stout, with the arms bent downwards and outwards sigmoidally, about 20-6000ths in. high, spreading to about 20-6000ths at the base, arms about 21 by 6-6000ths in their greatest dimensions respectively; 2, the common form of triradiate, but much thinner than the foregoing, with arms more or less equal and more or less equiangular, varying in measurement under 20 by 1-6000th in. The former very abundant and almost entirely confined to the ridges formed by the reticulated tubulation *on the surface*, the latter to the interior. No quadri-radiates. Size of specimen, which is compressed and nearly equilateral, $\frac{6}{12}$ in. high, upper border $\frac{1}{2}$ in. long, thickness of body $\frac{1}{8}$ in.

Obs. There can be no doubt that this is the same sponge as, only in a larger form than, that which I described and illustrated under the name of "*Leucetta clathrata*" ('Annals,' 1883, vol. xi. p. 33, pl. i. figs. 13-17); but we have here the tubular thread in a larger and distinctly *hollow* state, and not solid as assumed to have been the case in *Leucetta clathrata*, where, from contraction during desiccation, it had become solid, which, together with the smallness of the specimen, misled me into stating that it was "not hollow" (*op. cit.* p. 34), a mistake that I am thus able to have the opportunity of correcting, and of changing at the same time the name to *Clathrina tripodifera*, var. *gravida*, on account of the presence of the ova, above mentioned, which are in much the same condition as those in *Clathrina tripodifera*, whose description and dimensions have just been given. Hence the necessity of extended experience in laying down specifically the typical form of a sponge.

Of course, here we have the same structure as in *Clathrina*

tripodifera, but the tubulation, instead of being echinated and closed in, is without echination and separate; still, our "intervals," which in *C. tripodifera* we have considered to be analogous to Hæckel's "Intercanal System," are here simply open vacuities. Not considering these differences sufficient to constitute a distinct species, it has been designated as a variety of *C. tripodifera*.

Hitherto the *structure* has not presented any indications of that cancellous kind which we have called "parenchyma," although there has been a more or less distinct cloaca and general vent, especially in *Clathrina tripodifera*, that is there is no additional structure of this kind to be seen outside or inside the wall of the tubulation; but now we come to a structure in which there is a faint trace of this parenchyma in the angles of union of the lamina of which it is composed, as will be described in the following species.

5. *Clathrina laminoclathrata* (dry).

Specimen a subcircular patch about $\frac{3}{4}$ in. in diameter and $\frac{1}{12}$ in. thick, which has grown over a rocky substance. Clathrous, massive, sessile, spreading, lamino-reticulate. Colour now (that is in its dry state) steel-grey. Surface even, smooth, reticulated by the clathrous holing of the structure generally, which here makes its appearance in the form of circular interstices of different sizes up to $\frac{1}{24}$ in. in diameter. Pores in the lamina. No appearance of a vent or vents of any kind, *i. e.* spurious or real. Structure lamino-clathrous; lamina solid, composed of a thin layer of radiate spicules supporting the sarcode and other soft parts. Spicules of one form only, viz. triradiate, equiarmed and equiangled, varying in size under 75-6000ths in. in diameter, ray alone about 45 by 5-6000ths in. Size above given.

Obs. In this instance, which is unique among the calcareous sponges so far as I know, the tubulated staple thread of *Clathrina*, which so generally characterizes this genus, is replaced by a flat, solid, "tape-like" form or staple, whose edge when cut presents no appearance of mesodermal structure or parenchyma whatever, although towards the angles of union, where of course the lamina branches off to form the clathrous structure of the mass, there is a small angular space left which bears a faint trace of parenchyma, and this seems to introduce us to what in this way will become so much more evident hereafter. It is represented among the non-calcareous sponges by "*Echinoclathria favus*" ('Annals,' 1885, vol. xvi. p. 292).

In the next species that will be described, viz. *Clathrina primordialis*, the reticulated flat lamina of *C. laminoclathrata* appears to be replaced by a vermiculated tube, in which the walls are just as thin as the lamina of this species, but which tubulation by repeated branching, contortion, and anastomosis, all more or less in apposition, assumes the form of a solid mass of this kind of structure in which the intervals between the tubulation afford a much larger space for parenchymatous structure than in *C. laminoclathrata*; in short, wherein the quantity of parenchymatous structure is much greater.

6. *Clathrina primordialis*.

(See *Ascetta primordialis*, H. *op. cit.* Atlas, Taf. ii. fig. 13.)

A massive, shapeless, sessile, sublobate, smooth, solid lump, attached by a plurality of portions of the body elongated into podal points below, whose interspaces extend upwards in an irregularly excavated manner towards the surface, where the lobes of the mass terminate in thick, irregularly interuniting, round, submeandering ridges, with intervening depressions, some of which extend down to the interspaces between the points of attachment; ridges on a level with each other, forming the crown of the mass. Texture delicate, light as cork when dry. Colour when fresh not given, probably whitish, as in one of the specimens, but now more or less pinkish brown, probably, as before stated of *Clathrina tripodifera*, from having been in the proximity of a similarly coloured sponge. Surface minutely ridged, *quasi* fibro-reticulately, with more or less lozenge-shaped interstices, smooth, even, covered throughout with an epithelial layer of cells more or less transfixcd by the rays of subjacent spicules. Pores in the *quasi* fibrous ridges. Vents of two sizes, viz. small and large, both *unmarginated* and on a level with the surface, viz. :—1, smaller, circular, numerous, in the interstices of the fibro-reticulated ridges, averaging 1-48th in. in diameter, and about the same distance apart; 2, larger, also circular, but flabby and comparatively scanty, scattered irregularly among the rest, chiefly over the projecting portions of the crown. Structure tortuously tubular, the tubes composed of a single layer of triradiates, held together by sarcode, averaging about 1-72nd of an inch in diameter, but very irregular in their calibre, branched, anastomosing, and in juxtaposition but for the presence of a narrow strip of *parenchymatous* tissue, which here and there becomes widened out into angular spaces, where the circular walls of the tubulation fail to come in contact with each other. Angular

spaces differentiated from the cavities of the tubulation by the presence of reproductive bodies and sarcode, which, especially in the dried state, presents a sponge-brown colour, while the surface of the tubulation is white and without this; so the two are easily distinguished. The parenchymatous part terminates externally in the thin *quasi* fibro-reticulate ridges of the surface, where, as before stated, it is traversed by the pores; but what its connexions internally are I have not been able to determine, although, from analogy, one would be inclined to conjecture that it opened generally by pores and here and there by small holes (the latter probably for the exit of the reproductive bodies) into the cavity of the tubulation. On the other hand, the tubulation opens on the surface through the small and large vents, that is the former directly and the latter after having come from more dilated portions in the centre of the mass; but all appear to be more or less in communication. Spicules of one form only, viz. triradiate, equiarmed, equiangular; ray about 35 by 3-6000ths, varying in size under this with a few a little larger; densely charging the sarcode throughout, but especially on the surface, which is thus rendered a little more compact than the interior, so as in some specimens to present a cortical structure. Size of largest specimen, of which there are several, about 4 inches in diameter each way, being cubical.

Obs. In this species we cannot help seeing that the parenchymatous structure which intervenes between the contorted tubulation presents a still further step than in *Clathrina laminoclathrata* towards that which reaches its maximum in the Leucones and Teichonellidæ, as will be seen hereafter; at the same time that the dilated portions of the tubulation in the midst of the mass, in communication more particularly with the large vents externally, appear in the aggregate to be tantamount to a single cloacal cavity with general osculum; while the spaces occupied by the parenchyma appear to be the seat of Hæckel's "intercanal system," that is, the inter-spaces between the "radial chambers" in *Grantia ciliata* &c.

In the large specimen of this species, viz. that described, there are also ova, but apparently scanty and in a more advanced stage, mixed up with minute crustaceans, which would hardly be there if it were not for the presence of the sponge-ova, for it is at this time that they more particularly invade most destructively the calcareous sponges; hence it is not improbable that some of the ova may be theirs, which prevents my being able to say what the sponge-ova are like. But there is another body also scantily present which is quite new to me, but, being more plentiful in the following species,

viz. *Clathrina ventricosa*, it will be more particularly described there. At first I thought this was a fungoid spore with long tubular tail-like appendage; but its much larger size, absence of septa, and the refractive granules of the interior issuing through the tail seem to be opposed to such a view.

7. *Clathrina ventricosa*.

Individualized. Massive, lobate, sessile generally, or attached by a plurality of attenuated portions of the body, thus resting on such points, or not attached at all, but free and floating, furnished with a large cloaca and contracted mouth, or the same in a group with wide crateriform mouths. Colour white or pinkish brown, the latter probably owing to the proximity of a red-coloured sponge. Texture comparatively firm. Surface-structure consisting of a thick cortex of radiates covered with deep, polygonal, infundibuliform depressions or holes echinated round the inner ends and often diaphragmed there by cribriform sarcode; built up of large radiates, whose intercrossing rays give the polygonal form; almost in juxtaposition, and varying in size under 1-20th in. in diameter; or with the same reduced, probably by friction, to a white, homogeneous-looking, compact, cortical layer, in which the same kind of holes are present, but without the polygonal infundibular form, being simply subcircular and more or less variable in size. Pores in the intervals between the "infundibular depressions." Vents of two kinds, viz. small and numerous and large and single; the former, that is the small kind, at the bottoms of the "infundibular depressions" respectively, varying in size with that of the depressions themselves, echinated &c. at the inner end, as just stated; the latter large and single, bordered by a thin lip of fine structure about 1-16th inch wide; both leading to a large cloaca, whose surface is thickly beset with holes of two kinds, viz. one situated at the bottom of deep, broad, conical depressions, which vary in size, depth, and distance apart, and the other for the most part small, circular, and on the surface; both also communicating with the "hollow spaces" in the general structure of the wall, which will be more particularly mentioned presently; surface of the cloaca pierced generally with pores and sparsely echinated; echinating rays most abundant round the holes leading into the hollow spaces of the wall. Structure of the wall, which in some of the large specimens exceeds an inch in thickness, composed of vermiculated tissue, consisting of tortuously branched and anastomosing tubulation, which may be divided into two kinds, viz. that which is more

particularly defined by a cortex and *filled* with parenchymatous structure, and that which is *empty* or hollow, to which I have just alluded; the former in communication with the surface, the cloaca, and the hollow spaces by *pores* situated in these parts respectively, together with small holes, but much larger than the pores, in the cortex here and there, also opening into the hollow spaces. Hollow spaces or intervals communicating externally through the infundibular holes of the surface and internally with the cloaca through the holes in the surface of this cavity. Structure of the parenchyma cancellous, traversed by branched canal-systems which respectively open into the hollow spaces through the "small holes" in the cortex just mentioned; canals more or less echinated by the fourth ray of quadriradiates. Hollow spaces more or less smooth or sparsely echinated, like the cloaca. Spicules of two kinds, viz. triradiate and quadriradiate, both apparently equally abundant:—1, triradiate of two sizes, viz. large and small, the former equiradiate and equiangular, a little raised in the centre; rays stout, irregular in their outline, becoming suddenly much diminished a little way from the end, about 52 by 13-6000ths in their greatest dimensions; the latter or smaller similar, but with the ray more regular in form, about 35 by 4-6000ths; both forms variable in size between the measurements given. 2, quadriradiate, the same as the smaller triradiate in size, but with the fourth ray in addition curved and somewhat shorter. The large triradiates appear to be confined to the surface, where they are occasionally provided with a fourth arm, and the quadriradiates, mixed with the triradiates, to the interior generally, the former perhaps most abounding on those surfaces which are most echinated. Size varying with that of the specimen, of which there are upwards of a dozen, extending from that of a small bean to one nearly 6 inches in its longest diameter. The largest of all is the free or floating specimen, which is sub-ovoid, 3 inches high, that is placing the large mouth upwards (for there are several small ones about the body, each provided with a lip), and $5\frac{3}{4} \times 4\frac{2}{5}$ horizontally in its greatest diameters; the large mouth is 3 by $\frac{1}{2}$ inch in its greatest diameters, and the cloacal cavity much larger; wall averaging an inch thick. The rounded form combined with a compact, white, even, homogeneous-looking structure on the surface indicates that this specimen has for some time been free and floating; its parenchyma is abundantly charged with reproductive bodies. The next largest specimen was attached by several attenuated portions of the body, and, having been much less exposed to friction, presents a much more perfect state of the

surface. In form this specimen is more globular, being about 4 inches high by $\frac{3}{4}$ in diameter, but consisting of two individuals joined together, has two large subcircular vents, each about an inch in diameter, leading to two cloacæ below of much larger dimensions; while the specimen with crateriform vents, each of which is an inch in diameter, leading into cloacæ a little deeper, consists of a group of several such individuals joined together and sessile generally.

Obs. This is by far the largest and most abundant in specimens of all Mr. Wilson's calcareous sponges, and it is somewhat remarkable that, like the floating Auloplegma-form of *Clathrina tripodifera*, it should be abundantly charged with reproductive bodies. But for the asconoid or tubular structure of this species, the amount of parenchyma is so great that it closely resembles Hæckel's *Leucaltis floridana* in this respect (*op. cit.* Taf. xxvi.); and in some specimens the canals and spaces in the parenchymatous structure are so thickly echinated by the fourth ray of the quadriradiates that, on the other hand, they look like the echinated tubes of *Clathrina tripodifera*, while here, as in the latter, they are easily distinguished, especially in the sections of the dried portions, by their *yellow side*, owing to the presence of the dried sarcode and its contents lining in particular this part, while that of the "hollow spaces" is smooth and more or less white. Are the "hollow spaces" here analogous to the "intervals" in *Clathrina tripodifera*, which in the latter have been shown to be identical with Hæckel's "intercanal system;" while here they are apparently as evidently analogous to the "radial chambers" of *Grantia ciliata* &c., through which they may be homologized with the excretory canal-system in *Teichonella prolifera*? I must leave others to make the adjustment.

In some of the specimens which are altogether solid the small infundibular vents on the surface are supplemented by several larger ones, which, not leading to a *single* large cloaca, are in this respect like those of *Clathrina primordialis*, that is, connected with several dilated portions in the midst of the structure internally, which in the aggregate amount to a large single cloaca; but they differ from those in *Clathrina primordialis* in being all provided with a *lip*.

The large "free and floating" specimen of this species is plentifully charged with ova about 1-333rd in. in diameter, from which the germinal vesicle has in most instances disappeared, and in some of which the first line of segmentation seems to be visible. But the body to which I have just alluded as being scanty in *Clathrina primordialis* is here as

abundant as the ova, if not more so. It is a long elliptical cell, more or less slightly curved and more or less round at the free end, which sometimes appears to be flattened for a minute distance and sometimes doubly papillated, but the latter very indistinctly, and therefore not satisfactorily determinable; this at the other end opens widely into a long caudal tubular appendage, which becomes somewhat contracted in the middle, to expand again into a suctorial or trumpet-shaped form at its free extremity. In size the total length is about 33-6000ths inch, of which 12×6 -6000ths go to the cell or head and 21-6000ths to the tail, which is about 1-6000th in. in diameter at the extremity. The cell presents a large refractive nucleus at the free end, and the rest is filled with equally refractive spherical granules of about half the size of the nucleus, which can be traced as they issue through the tail, and sometimes form a heap at the end, where they have exuded. What this body is I am unable to conceive, unless it is a parasite which, like the minute Crustacea, infests the specimen.

Besides the large ova and these bodies &c. there are also small cells from 3 to 6-6000ths in. in diameter, sometimes nucleated, but always filled with spherical refractive granules like those of the yolk in the ova. Are these the spermatozoid cysts or cells? They, like the ova, are mixed up with the spongozoa, which are only about $1\frac{1}{2}$ -6000th or 1-4000th in. in diameter—measurements which could not have been made here or in the other instances had not the greater part of these sponges been, as they still remain, in an excellent state of preservation for this purpose.

8. *Clathrina latitubulata* (provisional, incertæ sedis).

Agglomerated. Composed of a comparatively large, more or less contorted and anastomosing tube about $\frac{1}{6}$ in. in diameter, swollen or dilated at short distances into rounded forms, which give it an irregularly knotted appearance, on each of which knots or prominent parts there is a single vent or none at all. Colour sponge-brown when fresh, whitish outside when dry. Surface even, composed of large radiate spicules interunited by more or less defined areas of cribriform sarcode. Pores large, represented by the cribrate areas. Vents single, naked, on the prominent parts of the lobes or dilated portions. Structure consisting of a very thin wall, most of which is cortex or surface-structure, not averaging more than $\frac{1}{15}$ in. in thickness, composed of two or more layers of large and small radiates, held together by the sarcode of the

surface, but more particularly by a comparatively thick layer of the same substance internally; continuous over one part and cribrated with large holes in another, opposite to corresponding holes in the cortex, rendered more or less polygonal by the intercrossing of the arms of the large radiates, and through which the cribriform areas of the surface can be seen. Spicules of two kinds, viz. triradiate and quadriradiate:—1, triradiates of different sizes, mostly regular in form and mostly large; ray 90 by 15-6000ths: 2, quadriradiates of two sizes, viz. very minute and very large; the former numerous, sagittal in shape, averaging only 10 by 1-6000th in the shaft, with arms respectively about half this length, and the latter, which tends more to a regular form and is scant, with arms 150 by 21-6000ths. No. 1 is chiefly confined to the cortex, the minute form of no. 2 to the sarcodic lining of the interior, with the large form here and there in the interior of the cortex. Size of specimen, which altogether is irregularly oblong, about $1\frac{1}{4} \times \frac{3}{4} \times \frac{1}{2}$ inch.

Obs. The structure of this species, if not abnormal, is very uncommon, on account of the general form in combination with such a thin wall; not less so the layer of sarcode over the inner surface, which is charged with the minute quadriradiates confusedly distributed throughout its substance, hence indicative of an abnormal condition. In general form, that is in outward appearance, it is very much like Polëjaeff's *Heteropegma nodus gordii* ('Challenger' Reports, 1883, Calcareia, p. 45, pl. i. fig. 7, and pl. iv. fig. 1), which also came from Australia, viz. from off "Cape York" at the N.E. angle, since that from the Bermudas appears to have been too much injured for illustration, but when anatomically examined proves to be totally different, as may be seen by the descriptions respectively.

[To be continued.]

XLVIII.—*On a Species of Echinocardium from the Channel Islands.* By F. JEFFREY BELL, M.A.

SOME weeks ago I received from Mr. Finlay of the Watt Museum at Greenock, an exceedingly fine specimen of *Echinocardium*, which he asked me to determine for that institution. A very superficial examination of the object showed me that it was altogether unlike any specimen in the British Museum, and that it could not be readily assigned to any described